ARTIFICIAL NEURAL NETWORKS FOR POWER SYSTEMS

A LITERATURE REVIEW

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ABSTRACT

Electric power systems represent complex systems involving many electrical components whose operation has to be planned, analyzed, monitored and controlled. The time-scale of tasks in electric power systems extends from long term planning years ahead to milliseconds in the area of control. The behavior of power systems is highly non-linear. Monitoring and control involves several hundred variables which are only partly available by measurements.

Artificial neural network models have been inspired by simple models of the biological neurons and their goal is to reproduce intelligent data evaluation techniques like pattern recognition, classification and generalization by using simple, distributed and robust processing units called artificial neurons.

They are highly parallel data processing tools capable of learning functional dependencies of data. Being adaptive units they are able to learn these complex relationships even when no functional model exists. They are robust with respect to incorrect or missing data.

Because of these properties ANN meet the requirements for safe and efficient power system operation. This realization has led to a sudden upsurge in applying neural net approaches to a number of power system problems. In this presentation an assessment of interest of the current state of the art of this research and development activity is provided. It is addressed to engineers applying or considering to apply Artificial Neural Networks (ANN) in planning and operation of power systems.

It provides a basic description of ANN principles and reports on a world wide experience from more than 100 different published research and industrial projects using ANN in the area of load forecasting, alarm processing, fault detection, component fault diagnosis, static and dynamic security analysis, system planning and operation planning. A condensed reference list of some ANN projects is provided in order to point the audience to some more detailed information in the different application areas.